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PART IV ELECTRON TUBES

Section 7 Camera Tubes

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ELECTROTECHNICAL VOCABULARY

PART IV ELECTRON TUBES

Section 7 Camera Tubes

0. FOREWORD

0.1 This Indian Standard (Part IV/Sec 7) was adopted by the Indian Standards Institution on 29 November 1973, after the draft finalized by the Electrotechnical Standards Sectional Committee in consultation with the Electron Tubes Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard deals with terms and definitions relating to camera tubes.

0.3 In preparing this standard, assistance has been derived from IEC Doc: 1 (IEV 531) (Central Office) 1031 'Draft revision of IEV chapter 07: Electronic tubes' issued by the International Electrotechnical Commission.

0.4 This standard is one of a series of Indian Standards on electrotechnical vocabulary. A list of standards so far published in this series is given on page 13.

1. SCOPE

1.1 This Indian Standard (Part IV/Sec 7) covers terms and definitions relating to camera tubes.

2. CAMERA TUBES

2.1 Electron Beam Tube — An electron tube the performance of which depends on the formation and control of one or more electron beams.

2.2 Camera Tube/Image Pick-Up Tube — An electron-beam tube for the conversion of an optical image into a corresponding electrical signal, usually by a scanning process.

2.3 Low Velocity Camera Tube/Cathode Voltage Stabilized Camera Tube — A camera tube operating with a beam of electrons having velocities such that the average target voltage stabilizes at a value approximately equal to that of the electron gun cathode.

2.4 High Velocity Camera Tube/Anode Voltage Stabilized Camera Tube — A camera tube operating with a beam of electrons having velocities such that the average target voltage stabilizes at a value approximately equal to that of the anode.

2.5 Photoconductive Camera Tube — A camera tube in which the photosensitive electrode is photoconductor.

2.6 Photoemissive Camera Tube — A camera tube in which the photosensitive electrode is photoemissive.

2.7 Image Camera Tube — A photoemissive camera tube having its photosensitive electrode separate from the target and in which the photoelectrons emitted are focused to generate a corresponding electron image on the target.

2.8 Iconoscope — A high-velocity photoemissive camera tube in which the beam scans a mosaic capable of storing an electric charge pattern.

2.9 Image Iconoscope — A high-velocity image camera tube in which the electron image is stored and scanned on the same side of the target.

2.10 Monoscope — An electron-beam tube capable of providing a picture signal derived from a fixed given image on an electrode inside the tube.

2.11 Orthicon — A low-velocity photoemissive camera tube in which the beams scans a mosaic capable of storing an electric charge pattern.

2.12 Image Orthicon — A low velocity image camera tube in which the electron image is stored and scanned on opposite sides of the target.

2.13 Vidicon — A photoconductive camera tube in which the electron image is stored on the photoconductive surface and scanned by an electron beam, usually of low-velocity electrons.

2.14 Storage Camera Tube — A camera tube in which the target acts as an electrostatic storage surface and the output is an electric signal.

3. ELEMENTS AND ELECTRODES OF CAMERA TUBES

3.1 Target — The electrode which stores an electric charge pattern corresponding to the input light flux and from which the signal current is generated by the scanning beam.

3.2 Storage Assembly — An assembly of electrodes (including the mesh electrode) comprising the target, the electrodes used to control storage, the electrodes which collect the output signal and the other parts used as a structural support.

3.3 Storage Element — An area of the storage surface that retains information which can be distinguished from that of adjacent areas.

3.4 Field Mesh Electrode — An electrode in the form of a mesh, adjacent to the scanned side of a charge-storage target, and designed to establish an equipotential plane that produces a uniform retarding field for the scanning beam.

3.5 Decelerator — An annular electrode mounted adjacent to the scanned side of a charge storage target to correct for the effects of the end field of the beam focus electrode.

3.6 Signal Electrode — An electrode from which the signal output is obtained.

3.7 Beam Focus Electrode — The electrode to which a variable potential is applied to focus the scanning beam.

3.8 Yoke Assembly — An external structure that provides the magnetic fields required for focusing, alignment and scanning of the beam.

4. CHARACTERISTICS OF CAMERA TUBES

4.1 Output Capacitance — The capacitance between the signal electrode and all other electrodes connected together.

4.2 Beam Focus Voltage — The voltage on the beam focus electrode necessary to focus the scanning beam on to the target.

4.3 Output Current — The current through the signal electrode lead.

4.4 Dark Current — The output current in the absence of light input.

4.5 Signal Current — The difference between the output current on the presence of light and the dark current.

4.6 Beam Alignment — The process of adjusting the angle of incidence of the scanning beam at the target by means of deflecting fields near the electron gun.

4.7 Beam Modulation Percentage — The ratio between the signal current for highlight illumination and the dark current expressed as a percentage.

4.8 Light-Signal Transfer Characteristic — The relation, usually shown by a graph, between the signal current and the illuminance on the photocathode.

4.9 Gamma — The slope, at any point, of the light-signal transfer characteristic plotted in logarithmic units.

4.10 Knee Point — A reference point on the light-signal transfer characteristic at which the gamma has a stated value.

4.11 Resolution — The amount of line detail which is reproducible.

4.11.1 *Square-Wave Response/Amplitude Response* — The ratio of the peak-to-peak signal amplitude given by a test pattern consisting of alternate black and white bars of equal widths to the difference in signal between large area blacks and large area whites having the same luminances as the black-white bars in the test pattern.

4.11.2 *Square-Wave Response Characteristic/Modulation Transfer Function* — The relation, usually shown by a graph, between square-wave response and the ratio of a roster dimension to the bar width in the square-wave response test pattern.

4.12 Sensitivity/Threshold Luminous Flux — The input luminous flux necessary to obtain a stated signal-to-noise ratio in the output.

4.13 Signal-to-Noise Ratio — In a stated bandwidth, the ratio of the peak-to-peak signal current to the rms noise in the output current.

4.14 Knee Luminous Flux (Knee Sensitivity) — The luminous flux at the knee point of the light-singal transfer characteristic.

4.15 Black Halo — The spurious darkening of the immediate surroundings of a bright object.

4.16 Geometrical Non-linearity — The disproportionate reproduction of a segmented line, either vertical or horizontal.

4.17 Picture Blemishes — Localized imperfections in the camera tube that produce unwanted signals usually visible as spots, smudges, lines and streaks in the reproduced picture.

4.18 Spot Nuisance Value — The product of the average diameter of a spot, expressed in terms of picture height, and its intensity, expressed in terms of a specified signal level.

4.19 After Image (Picture Sticking) — An unwanted image remaining after the apparent removal of the charge corresponding to a previously stationary image.

4.20 Lag/Smearing — Failure of the output current to follow variations of the light input instantaneously.

4.21 Edge Effect — A border of incorrect luminance outlining picture information and encroaching upon neighbouring areas.

4.22 Geometrical Distortion

4.22.1 *S-Distortion* — A picture distortion which gives the form of a letter ‘S’ to a straight line.

4.22.2 *Barrel Distortion* — A geometric distortion of a rectangular raster causing its boundaries to appear convex.

4.22.3 *Pin-Cushion Distortion* — A geometric distortion of a rectangular raster causing its boundaries to appear concave.

4.23 Shading — A camera tube phenomenon that causes a luminance gradient in the reproduced picture, not present in the original scan.

4.24 Raster Burn — A permanent change in the characteristics of the area of the target that has been scanned resulting in an incorrect signal corresponding to that area when a larger or tilted raster is scanned.

4.25 Electron Gun — An electrode structure consisting of a cathode and other electrodes, which produces and forms an electron beam of required shape, size and perveance, and which may also provide control in respect of its current density and velocity.

5. IMAGE ORTHICON

5.1 Target Cut-Off Voltage — The target mesh voltage just below which no video information can be obtained from the tube.

5.2 Image Focus Voltage — The photo-cathode voltage necessary to focus the photoelectrons at the target.

5.3 Photo-Cathode Radiant Sensitivity — The ratio between the photo-cathode current and the incident radiant flux.

5.4 Photo-Cathode Luminous Sensitivity — The ratio between the photo-cathode current by the incident luminous flux.

5.5 Ghost — Any suprious additional image of a picture highlight caused by photoelectrons reflected from the target at high velocity and subsequently returning to it at other locations.

6. VIDICON

6.1 Luminous Sensitivity — The ratio between the signal current and the incident luminous flux.

7. MISCELLANEOUS

7.1 Low Velocity Scanning — The scanning of a target with electrons of such velocity that the secondary emission ratio is appreciably less than unity.

7.2 High Velocity Scanning — The scanning of a target with electrons of such velocity that the secondary emission ratio is greater than unity.

7.3 Black Level — The signal voltage level as displayed in the waveform monitor when the camera tube light input is zero.

7.4 Picture Black — Those areas of the scene from which no signal current is obtained.

7.5 Picture White — Those areas of the scene from which maximum signal current is obtained.

7.6 Blanking — The action of periodically suppressing the video information by electronic means.

7.7 Blanking Period Interval — The period of time during which blanking occurs.

> NOTE — In this period, the scanning beam of the camera tube is returned to its starting point after completing one line or field and the line and frame synchronizing pulses are inserted.

7.8 Blanking Pulse — A voltage pulse used for blanking.

7.9 Blanking Level — An arbitrary reference voltage level from which the blanking pulse operates.

7.10 Test Chart/Test Pattern — The control pattern for the measurement of the camera tube parameters.

7.11 Grey Scale — A linear arrangement of contiguous panels of various luminance levels.

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